The economics of pensions

Principles, policies, and international experience

Edited by

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Contents

Part IV. Policy and regulation of pension systems

CHAPTER 1

Introduction and overview

Salvador Valdés-Prieto

Old-age security is an issue of universal concern, affecting richer and poorer countries across the world. Many economic, demographic, and political factors influence observed outcomes for the currently old and the level of old-age security perceived by the active generations in each country. In the past decade, the pension system in many countries has come under pressure. In the most dramatic cases, there has been an effective default on pension promises, throwing many older people into poverty. In the OECD countries and also in China, uneasiness among the working population has spread, as it has become apparent that future pensions are threatened by the demographic changes. Few believe that contribution rates will actually rise to the extremely high levels required to continue paying current pension levels as a ratio of average wages. Even in rich countries, old age does not look secure any more.[1]

Policy makers in many countries have now realized the importance of improving their pension systems. The academic community has a significant store of knowledge to offer, based on research done in the preceding 30 years. In the past few years, international comparisons between national pension systems – which differ widely across the world – have enriched considerably the stock of academic knowledge.

This collection of essays offers up-to-date treatment of a selection of the areas that have been found to be most critical for pension policy: the political design of pension policy, fiscal deficits and private savings in pension reform, macroeconomic policy and private pensions, and options for overall design of pension systems. The collection combines theoretical analysis with empirical evidence, providing case studies, econometric estimates, and simulations, all of which show the bearing of economic analysis on the actual policy

I am grateful for the comments of Dominique Hachette and an anonymous referee. They are not responsible for the contents of this chapter.

[1] According to *Time* magazine (1995), an opinion survey of 18–34 year olds conducted by Third Millennium in the United States found that 46% believe UFOs exist, but only 28% believe Social Security will still exist when they retire. I am grateful to Tim Miller for this reference.

problems and provide policy makers with the order of magnitude of the options.

1 The collection in perspective

This section provides perspective about the place of the policies discussed in this collection within wider classes of problems. This book covers public policies and institutions designed to improve old-age security *at the state or national level.* The emphasis on national policies means that the collection does not analyze other forces and institutions that have a bearing on old-age security, such as intrafamily support, village-level institutions, charitable organizations, fertility, and mortality. This does not mean that these forces are unimportant, only that they are considered exogenous and given. For example, the demographic transition is clearly critical for pension policy in the rich countries and China. Institutions like families, villages, and charities are and will continue to be the mainstay of old-age security in countries where formal sector coverage is low. For reviews of these other forces, see Ahmad, Drèze, Hills, and Sen (1991) and Entwisle and Winegarden (1984).

Within the range of government policies and institutions that relate to old-age security, this book concentrates on one specific institution: *publicly regulated pensions for old age.* This choice leaves aside important public policies such as mandatory health insurance for the old, subsidized housing for the elderly, and reduced income tax rates for the old. Insurance for disability and early death is mentioned in passing in some chapters. In some countries, such as the United States, these public policies have a large impact on the level of old-age security. However, we chose not to discuss them because pensions already provide some coverage for them as pension benefits are used by the old to purchase these goods and services as well as food, fuel, and clothing. In addition, the required analytical approach is different. For reviews of such government policies, see Hurd (1990), Warshawsky (1992), and Rivlin and Wiener (1988).

2 Occupational or mandatory pensions?

Within publicly regulated pensions for old age, the most prevalent policy is to *mandate* workers to contribute in exchange for an entitlement to old-age benefits. However, other public policies are important for the overall design of a pension system, and are touched on in the last part of this collection. The second most prevalent policy is to *subsidize* specific classes of voluntary long-term saving and insurance contracts, either by exempting the investment income of occupational pension plans from corporate income taxes, by exempting contributions from the personal income tax of the worker, by allowing occupational plans to invest in book reserves, or by offering subsidies to voluntary saving for old age, as in the Czech Republic since 1994. The third policy, which is a minimalist approach, is to provide *solvency regulation* of the firms that offer nonsubsidized voluntary savings and insurance contracts, such as annuities and whole life and disability insurance. This third policy approach is similar to that used for investor protection in securities markets. Although the analysis in this collection concentrates on mandatory pensions, empirical evidence from subsidized pensions is also presented when relevant.

In some circles it is felt that occupational pensions are a substitute for mandatory pensions. This is in part a reflection of the experience of English-speaking countries where occupational or "private" pensions operate independently from the state-mandated pension system. However, this point of view is limited by two facts. First, countries such as Australia, Chile, Malaysia, and the United Kingdom have developed a policy approach where state mandates are satisfied by purchasing pension services in the financial market, either through the employer or individually; this contradicts the apparent opposition between mandated pensions and the financial market. Second, occupational pensions are subsidized with tax exemptions and are becoming heavily regulated to protect workers from exaggerated claims by employers about the benefits granted by their occupational plans. Therefore occupational pensions have become as regulated as mandatory pensions. Indeed, when looking at international experience, it is clear that occupational pensions are an integral part of public policy, which should be coordinated with mandatory pensions.

3 The financial and employer approaches to the study of pensions

Studying pensions from the point of view of financial markets – emphasizing the costs and benefits of pension policy for financial intermediaries – is fruitful, but may induce the observer to lose sight of the purpose of pension policy. Some commentators in emerging countries go as far as suggesting that pension reform is needed to develop the domestic financial market. Likewise, a study of occupational pensions from the point of view of employers shows their costs and benefits for employers. However, from the point of view of national policy those approaches reverse means and ends, losing sight of the aim of achieving old-age security for workers.

The financial aspects of pension policy are important (see Davis, 1995, for a good exposition), but a narrow focus on the financial market and financial intermediaries can induce the policy maker to forget that pooling of many diversifiable risks such as longevity risk, early-death risk, and disability risk does not require the participation of financial intermediaries. Alternatives are legislated formulas, like those used in traditional state-run defined benefit pensions, and the pooling formulas used by the Teachers' Insurance Association of America, College Retirement Equities Fund (TIAA-CREF), the privately managed occupational pension system for college professors in the United States (see Greenough, 1990). A narrow focus on the impact of pensions on financial intermediation may also lose sight of the importance for workers of the expenses and fees charged by intermediaries. The evidence provided by David Blake in this collection suggests that this is not a minor issue easily dealt with by competition.

The development of the financial market can be achieved with policy tools unrelated to pensions. For example, an important policy determinant of financial development is regulation of voluntary financial contracts with the aim of investor protection and elimination of externalities. Only Part III of the collection emphasizes privately managed pension funds, in a discussion of their influence on monetary and exchange rate policy.

A focus on occupational pensions from the point of view of employers alone would also be incomplete. That approach is indeed fruitful. However, Lazear (1990) has shown that human resource management by large employers can be achieved with other policy tools unrelated to pensions. For example, employers could manage retirement and employer-specific investments through compensation plans that include stock options, instead of using pension promises. Still the emphasis on the employers' perspective has left the literature devoid of analyses of the issues of consumer protection raised by occupational plans. For example, if workers do not realize how much inflation will erode their occupational pensions once granted and how large is the share of employers that will go bankrupt and default on pension promises, a government intervention should be considered.

4 Part I: The politics of mandatory pensions

This collection approaches pensions from an economic policy point of view, which involves bringing together the tools of economic analysis and of political analysis. The latter is essential because pension policy is a creation of the state, not a market phenomenon. The evidence in Part I of this book suggests that the political aspects are relatively more important in pension economics than in other areas of economic policy. One reason is that pension institutions must function suitably over a time horizon that spans six or more decades, the time any given individual is expected to be a participant in the system. This period is long enough for the state itself to experience profound changes. Political change may affect the terms of pension rights and turn into a significant source of risk for the individual member.

Therefore, choice between basic options such as full funding or pay-as-you-go financing, between defined contribution or defined benefit pensions, between government-managed or privately managed pensions, and between monopoly or competitive supply of pension services should be based first and foremost on an assessment of the political capacity of the state at hand.

Part I of this book is devoted to the politics of pensions. The chapters by Diamond, Godoy and Valdés-Prieto, and Mitchell and Hsin discuss the political framework of pension policy from the theoretical and the empirical points of view. Together, they offer an important contribution to the understanding of pension policy not previously available in the literature. They suggest that the optimal pension policy is heavily dependent on the capacities of the political regime of the country.

Up to now, the approaches available to study pension policy have relied heavily on the welfare economics and political science paradigms. In the welfare economics literature, pension policy is analyzed as if it were a response to market failure or as the least costly way to pursue a noneconomic aim such as income distribution. Examples of this approach are found in Diamond (1977) and Kotlikoff (1987). In the political science literature, pension policy is considered to evolve in response to the forces that shape state formation, including the emergence of a patronage-free civil service, the democratization of the electorate, and other aspects such as constitutional constraints, as discussed in Orloff (1993). Historical episodes, such as the discrediting of poor relief in the Anglo-Saxon countries because of the adoption of an extremely harsh approach in the late 19th century, are also given prominence in political science.

In Chapter 2, entitled "Insulation of Pensions from Political Risk," Peter Diamond incorporates the risk of politics changing future policies, and how critical this is for current pension policy. He points out that pension legislation must be simple, but this implies a need for repeated legislated changes. Poorly chosen legislation is a form of risk generation, whereas well-chosen legislation is a form of risk sharing. This approach, where policy itself is recognized to be changing over time in a less than certain way, offers a significant improvement over the traditional approach in which future policies are assumed to be predictable. Going further than perfect-foresight credibility theory, Diamond brings the risk dimension to bear into the evaluation of discretionary policy.

The applications of this concept for pension policy analysis are numerous. Diamond argues that policy makers should prefer institutions that achieve differential insulation against political risk generation, without banning good political responses. In this sense, insulation from all change is a mixed benefit. For example, consider the defined benefit versus the defined contribution designs for pensions. Diamond points out that a defined contribution system such as the Chilean privatized mandatory pension system provides high insulation against harmful political acts of commission, whereas a traditional defined benefit system relies to a greater degree on legislative correction. However, a defined contribution system may suffer from the omission of potentially beneficial political acts.

Any example must begin by assuming that initial legislation was too simple and did not consider some shock adequately. For example, consider a defined contribution system that induces the expectation of a given replacement rate, but then a particular generation finds out that the conversion price of accumulations into annuities is higher than expected. In the defined contribution setting, politicians will find it very hard to legislate a (risk-sharing) initiative that compensates the losers, as it would require granting lump sum subsidies to the accounts of a particular generation, financed with taxes or public debt.

Diamond also discusses how contribution-based and benefit-based systems can be designed to vary the degree of reliance on further legislation. The measures discussed include constitutional rules granting the status of "property rights" to pension benefits, automatic adjustment of benefits to available revenue in defined benefit systems, earmarking of certain revenue sources such as a wage tax, the role of uniform tax treatment of pension income with other forms of income, the pros and cons of higher visibility of legislated changes in the public arena, the use of professional panels whose advice must be explicitly overridden, and the description of the system in the eyes of the public.

Oscar Godoy and Salvador Valdés-Prieto in Chapter 3, entitled "Democracy and Pensions in Chile: Experience with Two Systems," offer an analysis of the politics of Chilean pensions. They consider the old pension system in the 1950s and 1960s, which was partially replaced in 1979–1980. Currently two pension systems coexist in Chile, which are the new privatized and funded system and the unified, state-run, and pay-as-you-go financed system. The reader is advised that this chapter does not include a description of the new Chilean pension system. Diamond and Valdés-Prieto (1994) offer a suitable description; Piñera (1991) describes the Chilean reform's politics.

Godoy and Valdés-Prieto point out that the relationship between politics and economics in pension systems run both ways. When the overall design of the pension system encourages certain relationships between voters and politicians, such as patronage, these relationships gain in strength and may affect the path of the political process. The first part of their chapter reviews the political ideals on which the old pension system was based, which were the ones of welfare states. The political acceptability of the significant power of politicians and bureaucrats found in welfare states is predicated as a necessary means to achieve an increase in equality – in this case redistributive pensions. However, as the Chilean political regime was characterized by heavy patronage from political parties and their controlling clique, the actual pension system delivered an increase of inequality and an increase of the power of the political cliques over the ordinary citizen. As this power reduced the legitimacy of democratic decisions, this process ultimately retarded the development of democracy in Chile.

The chapter then describes how the two current pension systems were reformed with the aim of preventing patronage, and how several of the techniques discussed by Diamond were used. Privatization, the selection of a defined contribution scheme, abandonment of redistribution within the pension system, and a constitutional provision that prevents parliamentarians from initiating law in pension matters were used to insulate the new pension system from patronage. The degree of insulation between politics and pensions increased dramatically, one result being that the new system does not have an influence on the political regime.

The state-managed system was reformed as well, by merging 32 institutions into one and by unifying the benefit and contribution conditions. It continues to be defined benefit and financed by the pay-as-you-go method. To test the effects of these political reforms, Godoy and Valdés-Prieto analyzed cost-of-living adjustments to the pensions of the state-managed system over 1985–93 and found that patronage-style manipulation is much less in the new democratic political context than it was in the 1950s and 1960s. However, the state-run system continues to be used for manipulation in the political-economic cycle. This suggests that the defined-benefit design has a separate influence that generates some costs even in the best of circumstances.

Godoy and Valdés-Prieto also note that political patronage is impracticable within the new privatized and funded pension system. Negotiation with the political class, except for the pressure to maintain universal equality before the law, is not required from members. The new private system allows selection of a fund management company, granting more freedom to individual members than well-run welfare states provide to their citizens. The authors develop a case study of the new system, concerning the 1992 default by a state-owned coal company on bonds sold to the pension funds of the new pension system. The pension fund management companies confronted in the courts the ministry that managed this coal company. That confrontation, which would be unthinkable in a state-run system, was stimulated by the fact that only a few fund managers had bought those bonds and their investment ability was at stake.[2]

[2] The fact that most countries exempt occupational pension funds from income taxes also suggests the effectiveness of private lobbying power in defending the rate of return from political interference.

In Chapter 4, entitled "Public Pension Governance and Performance," Olivia Mitchell and Ping-Lung Hsin offer an econometric investigation of the implications of the institutional design for the funding and rate of return earned by pension plans. Their database includes 269 separate retirement plans set up by states and municipalities in the United States for their employees. These plans vary substantially in the type of persons that can fill the role of trustees, and in their independence from politicians and elections.

This allows a natural test for the propositions enunciated by Diamond and Godoy and Valdés-Prieto. In particular, Mitchell and Hsin measure the impact on the degree of funding of institutional variables like the requirement of board members to carry liability insurance, the existence of stress in the sponsoring government's fiscal condition, the degree of employee representation on the board, and the absence of balanced-budget legislation. They find that the requirement of board members to carry liability insurance increases the degree of funding. The existence of stress in the sponsoring government's fiscal condition and a larger degree of employee representation in the board has a significant negative influence on funding.

Mitchell and Hsin also study the impact of these institutional variables on the rate of return achieved by invested funds over 1986–1990. The importance of maximizing the rate of return can be seen in a standard case, where 70% of pensions paid are funded by reinvested earnings rather than by contributions.[3] They find that boards having more trustees elected by active employees earned significantly lower investment returns over five years. The same happened to pension plans that invested a higher share of their portfolio in the home state. Another important finding is that the rate of return was not increased by hiring external money managers, augmenting the body of evidence that suggests that external fund management per se does not add much value (Lakonishok, Shleifer, and Vishny, 1992).

Summing up, Part I shows why the capacity of the national political institutions must be the basis of any realistic choice between the basic design options. If one of these options is made on the basis of a rosy assessment of the political regime's capacity, the whole policy may fail, as the international experience shows. Part I also shows how institutional design may be chosen in order to obtain the most from a given political capacity. This is where privately managed systems show their greatest advantage.

5 Part II: Fiscal deficits and private saving in pension reform

When starting a pension system de novo, policy makers can choose between full funding or pay-as-you-go financing, between defined contribution or

[3] This calculation is based on a constant real rate of return of 4% per year, a contribution history of 40 years, an expected retirement for 20 years, and a constant age-earnings profile.

defined benefit pensions, between government-managed or privately managed pensions, and between monopoly or competitive supply of pension services. However, most policy makers start from an existing pension system and must choose whether and how to reform it. An important policy question is whether initial conditions could make a large difference when choosing an option.

In some of these choices, initial conditions are not critical. For example, if monopoly supply of pension services is to be abandoned in favor of competitive provision, the transition is short and simple. Policy makers should only be careful about using methods that reduce the transition costs related to the marketing area. As a second example, consider a change from defined benefit to defined contribution pensions. This reform must be gradual, because workers must be informed in advance and because time is needed for purchase of deferred annuities at several points in time. Still, initial conditions are not too restrictive.

Instead, a reform of the financing method raises much more complicated issues. Change in one direction is easy, but in the reverse direction it is difficult. A reform that moves from full funding toward pay-as-you-go financing is "soft," as it allows the authorities to spend the initial pension fund and it is always easy to find politically advantageous uses for newly found resources. This reform is equivalent to starting a policy that increases the public debt–GNP ratio by 2 to 4 percentage points per year. The political obstacles to such a reform depend on the political design of the pension system and on the degree of political development of the country, as discussed in Part I. If the pension funds are collectively owned and managed by politically designated authorities, and fiscal revenue is down temporarily, there will be few objections to this reform, as shown by worldwide experience with provident funds (World Bank, 1994).

The interesting reform is the reverse movement, from pay-as-you-go financing to full funding. This is hard, just as reducing the public debt–GNP ratio is hard. The economic calculus may recommend such policies for a heavily indebted country, but the political calculus is discouraging because the benefits are obtained far into the future, when the ruling politicians will no longer be in power. Part II of this collection is devoted to this problem.

There is a third type of initial condition relevant for most developing countries. In this case, the initial financing method is pay-as-you-go but the system has not matured yet. A pension system can be immature for two reasons: recent creation or growing coverage. It is immature because of recent creation when the current ratio between pension expenditure and the contribution revenue that would have been collected if contribution rates had been set at the long-term level required to balance the budget of the pension institution is less than the steady-state ratio. This ratio can be below the steady-state level only because the first generation of contributors has not reached the pension age yet. On the other hand, a system may be immature because of growing coverage – that is, when the coverage of contributions is expected to rise over the next few decades. This sort of immaturity is the politically softest, as it allows increases in revenues without increasing the contribution rate. It works by making contributions mandatory to an ever larger portion of the employed population.

In immature systems there is a cash surplus, which must be spent if a pay-as-you-go status is to be reached in the steady state. Among ways to spend this surplus, the total contribution rate may be small (e.g., it was 3.5% in 1995 in El Salvador and it was 5.5% in the United States until 1960) or full pensions may be granted to workers who have just 20 years of contributions (as in Costa Rica in 1994) or the pension system cash surplus may be used to pay for free health care (as in Argentina in the 1950s). In the United States, the surplus generated by growing coverage was used also to increase the level of pensions in real terms.

When the initial condition is immaturity of the pension system, policy makers can consider a reform that is much less demanding for the fiscal accounts than moving back to full funding. This is to stop the *growth* of the unfunded debt of the pension system, without reducing it. This reform requires using all the revenue coming from further increases in coverage, plus the revenue from a tightening of contributions and eligibility conditions for benefits to the levels required once maturity is achieved, to build a fund invested in private sector securities. The contribution rate need not be increased until when the ratio between the pension fund and accrued liabilities threatens to fall, which happens close to maturity. This reform leads to a partially funded system in the long term, if political safeguards such as those discussed in Part I succeed in preventing shortsighted politicians from spending the fund.

As a reference, the reader should recall that a reform leading to a reduction of the public debt–GNP ratio has the same economic features as a reform from pay-as-you-go to full funding: The benefit comes far away in the future. However, from a political point of view, a reduction in the public debt ratio is preferable over a reduction in the accrued pension debt when the pension system is defined benefit, because of a framing effect: Defined benefit pension systems direct public attention to benefits alone, hiding the relationship between individual contributions and benefits (Diamond, 1995). If that relationship were made explicit, as it happens in defined contribution systems, it would be hard to justify the enormous windfall transfer granted to the generations alive when the pay-as-you-go method began to be used.

It has been claimed recently that there are circumstances in which the introduction of a pay-as-you-go financing scheme may increase voluntary private savings permanently. This runs counter to the well-established notion that in a closed economy the stock of physical capital must fall in the long term when pay-as-you-go financing is introduced or public debt is issued. The argument is that if workers are credit constrained, then mandated contributions must reduce their consumption one for one. If the revenue is granted to pensioners, but they save part of the funds (maybe because they have a precautionary savings motive, justified because no markets are available to annuitize their wealth at actuarially fair prices), then private saving increases. As government savings are untouched, national saving and the stock of physical capital must rise, although lifetime welfare must fall (Boadway and Wildasin, 1993). This type of situation appears unlikely because (1) pension benefits are usually granted as an annuity, so there is no justification for precautionary saving because of longevity risk. (Therefore, when the pension annuity becomes available, total precautionary savings should be reduced); (2) it is unlikely that all workers are credit constrained; and (3) mandatory contributions force a delay of the stage of life in which precautionary savings stocks are accumulated, reducing aggregate saving.

Another important point concerns the impact of the pension system on the labor market. One of the ways in which pay-as-you-go financing distorts the labor market is its implicit tax rate. To be more precise, let me introduce the notion of an "age-adjusted marginal tax rate on contributions" associated with a pension benefit formula, which I define as follows:

$$\tau_x = 1 - [\partial\, \mathrm{EPV}\{\mathrm{Benefits}\}/\partial c_x] \tag{1}$$

where: τ_x = age-adjusted marginal tax rate on contributions made at age x. It is given by the proportion of a contribution of \$1 that is not recovered in the form of additional pension benefits. If θ is the contribution rate, expressed as a proportion of wages, the implied marginal tax rate on labor supply to the formal sector is the product $\theta \cdot \tau_x$.

In definition (1), c_x = amount of the contribution made at age x, and

$$\mathrm{EPV}\{\mathrm{Benefits}\} = \int_x^{\infty} B(a, c_0, c_1, \ldots c_R, w) S(a,x) e^{-\int_x^a r(z)dz} da$$

is the expected present value of pension benefits, taking into account the benefit rule, the mortality table, and the discount rate. This formula is valid for a single person without survivors.

B( ) = pension benefit formula, that represents the flow of benefits (pensions) per unit time as a function of the individual's age "a," his contribution history (c_0, c_1, . . . c_R), and other factors (such as real wage growth or real interest rates in the economy) included in vector w.

S(a,x) = probability of surviving to age "a," measured as of age x (x < a).
r(z) = instantaneous discount rate at time z. This rate may be much higher than market interest rates if the worker is credit-constrained.

A simple exercise illustrates the magnitudes of this marginal tax rate in the case where the pension system is *not* redistributive and is balanced, which corresponds to a "notional accounts" system like those introduced in Sweden and Italy in 1995. Consider the case where the real annual interest rate is 4% and the rate of return of the mature balanced pay-as-you-go system is 1.5%. If pension age is 60 and the worker expects to be pensioned for 20 years, and the mortality table is such that S(a,0) = 1 for all a in [0,80] and S(a,0) = 0 otherwise, then the marginal tax rates on contributions made at ages 20 and 60 are 70% and 20%.[4] If in addition the pension system attempts to redistribute wealth from rich to poor, say, by choosing as in the United States $B = \alpha + \beta \cdot$(average indexed monthly earnings), the age-adjusted tax rate on contributions increases substantially, both for the poor and the rich, either young or old.[5]

These estimates do not take into account other factors, such as income taxes and the unsuitability of savings held in pension accounts for meeting the precautionary savings motive. However, they do illustrate the effects in the labor markets of a pension system that pays financial returns below market interest rates. These effects are governed by the implied marginal tax rate on labor supply, namely the product $\theta \cdot \tau_x$. Of course, as long as τ_x does not go above 100%, this implied tax rate cannot surpass θ, the full contribution rate.[6] In turn, high marginal tax rates on earnings from formal and dependent employment induce an increase in independent employment and

[4] In the general case, if d = rate of return offered by the PAYG system and r = rate of return on safe personal savings, then

$$\tau_x = 1 - \left[\int_R^{\infty} S(a,x) e^{-\int_x^a r(z)dz} da \Big/ \int_R^{\infty} S(a,x) e^{-\int_x^a d(z)dz} da \right],$$

where R is the age of pensioning. In a funded pension system d = r for workers who are not credit-constrained and therefore $\tau_x = 0$ for *all* ages x and all R. However, for young credit-constrained workers this tax rate should be close to 100% even in a fully funded pension system invested in the financial market.

[5] Auerbach and Kotlikoff (1987, section 10D) argue that these high marginal tax rates can be eliminated by suitable redefinition of pension benefits. They propose benefits to be *negative* for zero contributions and to increase one for one as contributions increase. Namely, if $B = \alpha + \beta \cdot$[AIME], they propose $\alpha < 0$ to obtain $\beta = 1$. But $\alpha < 0$ is a hidden lump sum tax, which fails to be such when coverage by the social security system is not guaranteed at 100%. Moreover, if coverage were 100%, the social security system could be used to levy general revenue, so that distortionary taxes such as VAT and income tax could be abolished. We disregard these nonlinear tax schedules in the text.

[6] I owe this point to an anonymous referee.

of informal or illegal employment relationships. The illustrative numbers show that this effect should be much stronger among the young, who may lose essential experience in the formal sector.

In Chapter 5, Corsetti and Schmidt-Hebbel review the evidence about the long-term economic gains that a reform from mature pay-as-you-go to full funding can offer in two settings: if a traditional growth model represents the economy; and if a growth model with externalities represents the economy. Their discussion is relevant for policy makers because it shows very clearly the trade-off they confront: If a traditional growth model represents the economy, a pension reform that moves toward funding is fiscally expensive in the first thirty years, and its long-term payoff (after 30 years) is positive but spread over centuries, so it is rather small per year. The benefit could be much larger if a large externality is present in the economy, even if it is still far away in the future.

How likely is it that this reform will yield a substantial benefit? Corsetti and Schmidt-Hebbel point out that empirical analysis becomes essential. They report that there is simply too little evidence to be sure, as most countries have been drifting away from funding and many years of data would be needed. However, the threads of evidence that are available – the authors provide the first econometric evidence on the impact of the shift to funding on the Chilean private sector saving rate – suggest that positive externalities do exist and benefits are substantial. Recent work by Feldstein (1995) suggests that the impact on national savings of movements away from funding was much larger in the United States than what traditional models suggest. The policy maker is forced to make a choice without much reliable information.

Chapter 5 is also important because it offers one of the few systematic discussions of the possibility of social gains from reducing the size of the informal sector of the labor market. Recall first that an important feature of mature pension systems that are financed with the pay-as-you-go method is that they pay an aggregate steady-state return that is below the economy's real interest rate (Tirole, 1985).[7] Under most conventional arrangements, this

[7] In the late 1960s social security experts argued that pay-as-you-go financing could be more or less efficient than funding, depending on whether "g," the growth rate of the economy, was larger or smaller than "r," the real rate of return on assets, which in turn was an empirical question. However, asset market equilibrium requires $r > g$. This is because the profits of firms must grow at rate g, with the economy. If r fell below g, then it would be possible for any long-term institutional investor to borrow at rate r and invest in a diversified equity portfolio whose profits grow at rate g and earn an arbitrage profit of $g - r > 0$. However, as more and more investors engage in arbitrage, the demand for credit would rise and the demand for investment would fall until r increased above g. Another way of seeing this is that the fundamental price of the equity of an infinitely lived diversified corporation is $P = (\text{initial profit})/(r - g)$ which becomes infinite if $r < g$ (Tirole 1985, p. 1507). For empirical arguments for ignoring the case where $r < g$, see van Velthoven, Verbon, and van Winden (1993).